Trends

2

CHANGE IN MOTION

“Trend is not destiny.”

LEWIS MUMFORD

Trends

How well our transportation system performs directly affects the day-to-day mobility of people and goods, and on a macro scale, shapes the Bay Area's economic vitality, growth patterns and quality of life. For Transportation 2035, performance is the driving force for change in the way we formulate our policies, define our priorities, and decide on our transportation investments. Using performance metrics allows us to assess current and projected trends, and affords us the opportunity to change our course should our analyses foretell trends that take us in the opposite direction from where we want to be in 2035.

The Draft Transportation 2035 Plan embraces performance, beginning with the identification of a set of highly specific performance objectives against which to evaluate prospective investments. Though they are planning goals rather than strict legal mandates, the performance objectives nonetheless help translate the plan's Three E principles — Economy, Environment and Equity — into an integrated set of policy choices to make our region more dynamic, more livable and more sustainable.

Snapshot of the Bay Area in 2035

Before we determine whether the Bay Area can meet the plan's aggressive performance objectives, we must look first at our existing growth and travel conditions, and then use the latest planning assumptions to forecast what future growth and travel trends might look like in 2035. This helps us to establish future baseline conditions if no new investments are made and no new policies adopted. These trends, which are based on past performance, show us what our future might look like if we do not take action to change our direction. Highlights of the key 2035 trends, absent any interventions, are discussed in the following pages. (See chart on page 23 for a comparative look at many of those trends).

Currently under construction, the new East Span of the San Francisco-Oakland Bay Bridge will open to traffic in 2013.

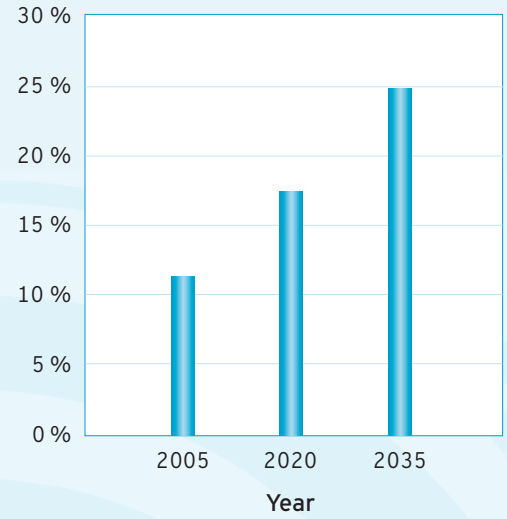
More People, More Jobs

Today, the Bay Area is home to just over 7 million people, and supplies nearly 3.5 million jobs — making our region California's second-largest population and economic center. Between now and 2035, job growth will increase nearly 1.7 percent a year, outpacing the rate of population growth over the same period. The Bay Area will grow to 9 million people by 2035, a 26 percent increase from 2006, or an average of 0.9 percent growth a year. Employment will grow to 5.2 million jobs by 2035, a 50 percent increase from 2006. With more people and more jobs in the region, our local roads, highways and transit systems will face unprecedented demand in the years ahead.

Population Grows Older

The Bay Area population also is growing older. In 2005, about 11 percent of Bay Area residents were age 65 or older. But by 2035, 25 percent of the population will be 65 or older (see chart above right). Furthermore, the number of people over age 85 will nearly triple by 2035. More members of the older population will be active in the workforce in 2035, and more are likely to be living in urban areas, where services are clustered and public transportation is available. As the population ages, there will be greater demand for paratransit and specialized mobility services.

Share of Bay Area Population Age 65 or Older



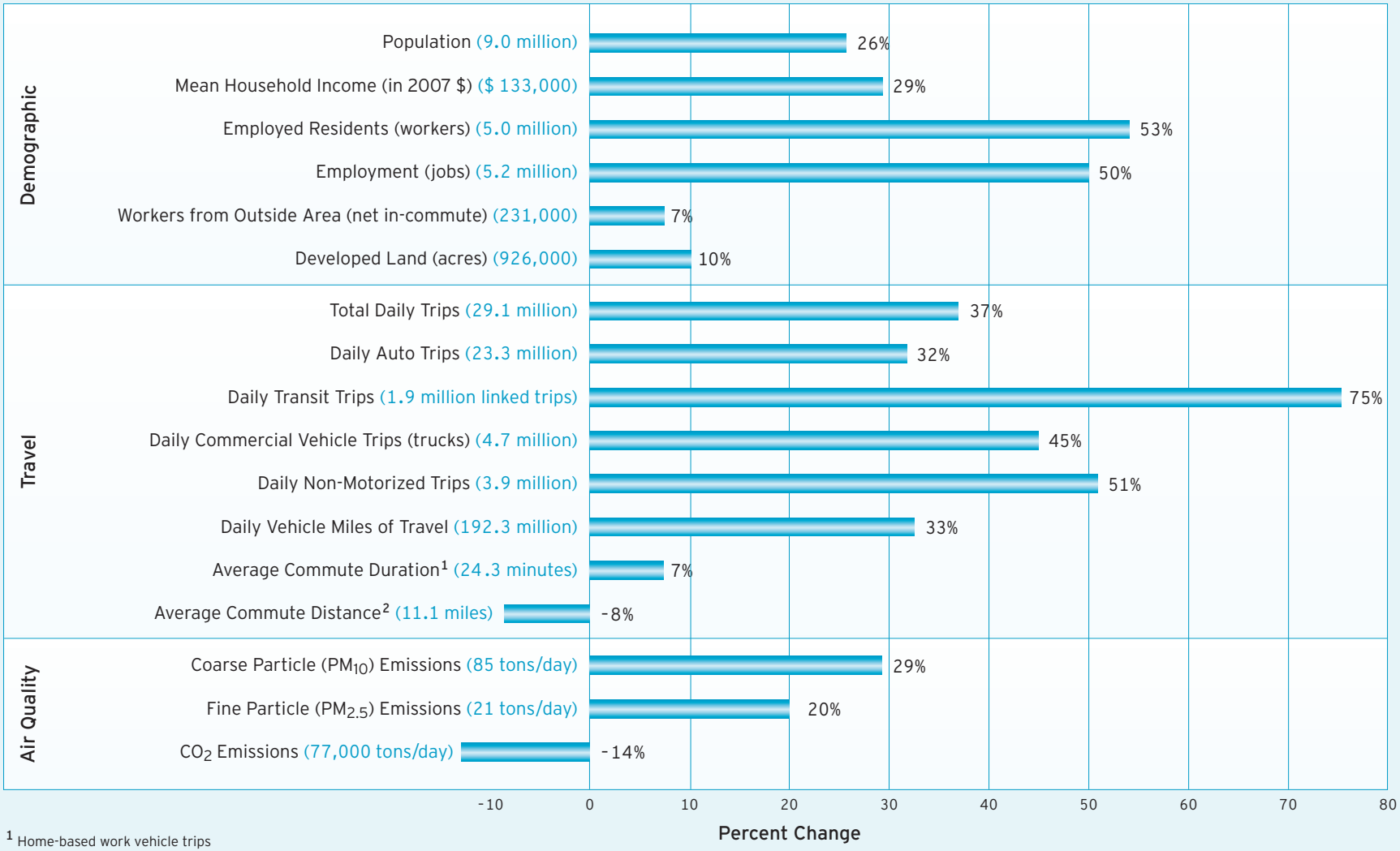
Source: ABAG Projections 2007

Transportation Affordability Favors Urban Residents

Average household income in the Bay Area will rise in real terms from $103,000 in 2006 to $133,000 in 2035, a 29 percent increase. However, transportation affordability for low and moderately low-income households will remain unchanged in 2035. Transportation costs as a share of income for low- and moderately low-income households will decrease slightly by 2035, from 22 percent to 21.5 percent. This may be more the result of incomes rising than

Regional Demographic, Travel and Air Quality Indicators

Bay Area Total in 2035 (future conditions, without Transportation 2035 Plan) and Percent Change from 2006



[1] Home-based work vehicle trips

[2] Home-based work vehicle driver miles

Sources: MTC; ABAG Projections 2007

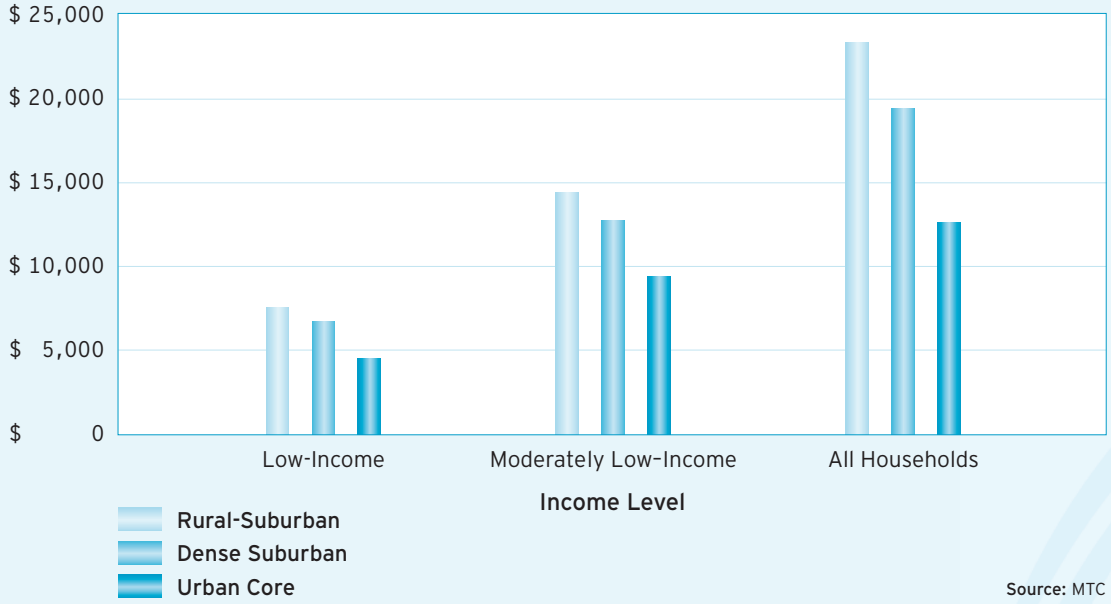
transportation costs decreasing. Also contributing to lower transportation costs is a predicted drop in the number of vehicles per household from 1.4 today to 1.3 in 2035.

Land use exerts a powerful influence on the affordability of transportation. Total annual transportation costs for all households will be lower for those closer to the urban core (as shown in the chart to the right). This is true for all income levels, including the low-income and moderately low-income segments of the population (as shown). By living close to jobs and essential services, households can significantly reduce their annual transportation costs, demonstrating the economic benefits of more compact growth patterns.

More Travel, More Congestion

Travel activity as reflected by daily auto trips would increase by 32 percent and the amount of vehicle miles traveled would grow by 33 percent. Both are slightly higher than the rate of population increase, but lower than the expected rate of employment growth. Daily hours of vehicle delay would increase by 135 percent, which would boost average daily delay per vehicle to 4.6 minutes (from 2.7 minutes today). Daily transit trips would grow by 75 percent, reflecting assumptions that new population and employment growth will be more focused in the urban core and along transit corridors (see chart on page 23).

Projected Annual Household Transportation Costs in 2035



Source: MTC

A Mixed Forecast for Air Quality

Air quality conditions will change in the future — ground-level ozone and greenhouse gas emissions will decrease, but particulate matter will increase by 2035. Emissions of the precursors to ozone — reactive organic gases and nitrogen oxides — will decrease by 71 percent and 79 percent, respectively, due largely to cleaner vehicle engines and fuels and reduced emissions from industrial and commercial sources.

Carbon dioxide emissions are projected to decrease by 14 percent as vehicle and fuel technologies improve due to stricter state and federal mandates, as older fleets turn over, and as individual attitudes and travel behaviors change (see chart on page 23). However, as population grows and miles driven increases, particulate matter emissions from tailpipes and road dust also will rise, with a 20 percent increase for finer particles ($PM_{2.5}$) and a 29 percent increase from coarser particles (PM_{10}) in the forecast.

Making Performance The Objective

These long-range forecasts sketch a statistical picture of the Bay Area in the year 2035. It is not a complete picture, but it does offer a set of benchmarks against which to evaluate the potential impacts of planning decisions and policy initiatives. And, in fact, the Draft Transportation 2035 Plan explicitly employs a performance-based planning approach, one that focuses on measurable outcomes of potential investments and the degree to which they support stated policies.

During the visioning phase of plan development, we used performance metrics to test and learn from "what if" questions prior to making investment decisions. Initially, the Commission identified six specific standards by which to measure over the next 25 years our progress toward strengthening the Bay Area economy, protecting the region's environment, and improving social equity. These performance objectives include:

- Reduce freeway congestion to 20 percent below 2006 levels;
- Reduce daily vehicle miles traveled (VMT) per person to 10 percent below 2006 levels;
- Reduce carbon dioxide (CO_2) emissions to 40 percent below 1990 levels;
- Reduce emissions of coarse particulates (PM_{10}) by 45 percent below 2006 levels;
- Reduce emissions of fine particulates ($PM_{2.5}$) to 10 percent below 2006 levels; and
- Reduce by 10 percent the share of low-income and moderately low-income residents' household earnings consumed by transportation and housing.

These performance objectives are modeled in large part after state laws and policies, notably Gov. Schwarzenegger's Strategic Growth Plan; Senate Bill 375 (2008), which links transportation funding with land-use planning; and Assembly Bill 32 (2006), which mandates a reduction in greenhouse gas emissions. Targets for reducing the Bay Area's particulate emissions are specified in anticipation of the U.S. Environmental Protection Agency declaring the region a nonattainment area for compliance with the federal standard for fine particulate emissions.

Sharpening Our Aim

To determine whether the performance objectives are achievable and to gauge how far we might be able to "move the needle" in the right direction, MTC planners conducted a "what if" analysis that modeled two distinct sets of strategies: 1) a set of three hypothetical investment packages to beef up the Bay Area's transportation infrastructure; and 2) aggressive pricing and land-use policies that, if adopted without modification, would dramatically raise the cost of operating a private vehicle and would concentrate most future population and job growth near transit and in already-developed parts of the region. In each case, we specified an infrastructure option that would be most effective in meeting the performance objectives, and then we gauged the additional impact of the pricing mechanisms and the land-use policies before applying our final test — which combines infrastructure investment, land use and pricing. For complete information about testing of the performance measures, please see the supplemental *Transportation 2035 Performance Assessment Report,* listed in Appendix 2.

A Trio of Infrastructure Options

Three hypothetical, financially unconstrained infrastructure investment packages were evaluated.

Freeway Operations

The first of the infrastructure alternatives is a $600 million package of projects designed to increase the efficiency of Bay Area freeways by improving traffic flows and speeding the response to accidents, stalls and other on-road incidents. Known as the Freeway Operations alternative, this comparatively low-cost strategy would employ proven technologies such as freeway ramp metering; changeable freeway

message signs; coordination of traffic signals along adjacent arterials; and a handful of select carpool lane projects (totaling about 43 miles) to close key gaps in the regional network.

HOT Lanes and Bus Enhancements

The second infrastructure package — which would cost up to $10 billion over 25 years — centers on high-occupancy toll (HOT) lanes and expanded express bus service. HOT lanes would be free of charge for buses and carpools, and available to solo drivers who pay a toll to use remaining capacity. This HOT Lane and Bus Enhancements alternative would convert 500 miles of existing carpool lanes to HOT lanes, and add another 300 miles of HOT lanes to close gaps and expand the regional carpool lane network. In addition to funding additional express bus service that would operate in the new lanes, this alternative also would include significant expansion of local bus services to feed the express bus network.

Regional Rail and Ferry

The last of the infrastructure packages tested is a $60 billion investment in regional rail and ferry services. Incorporating myriad expansions and other improvements to BART and passenger railroad lines throughout the Bay Area, this alternative also includes two high-speed rail alignments over the Pacheco Pass and the Altamont Pass, and a bevy of new ferry routes.

Making the Cost of Driving Expensive

To assess the impact of pricing on these investment packages, we tested several aggressive transportation pricing schemes that, if adopted, would lead to a large cost penalty for operating a private vehicle. These include a carbon or vehicle-miles traveled (VMT) tax that on its own would increase the cost of driving by 20 percent, plus parking surcharges of $1 per trip and congestion tolls of 25 cents per mile for freeway driving during peak commute periods.

The cumulative impact on a typical 11-mile, peak-period commute on a congested freeway would be a three-fold increase in driving costs, to $1.28 per mile from 39 cents per mile. Analysis of the pricing strategies assumes that a discount program of some kind would be available to help mitigate the financial impact for lower-income travelers.

Directing Even More Focused Growth

On the land-use side, we tested ambitious policies that would go beyond the assumptions in ABAG's adopted *Projections 2007*. Collectively known as Focused Growth, these policies involve incentives to channel new housing and jobs into existing communities in the urban core rather than around the region's outer reaches. Emphasizing accessibility over mobility, the Focused Growth model aims to reduce the region's jobs/housing imbalance by encouraging new residential projects to be built close to jobs, transit, shopping and services.

Projecting Regional Growth

As with past long-range transportation plans, the Transportation 2035 Plan uses the economic-demographic forecasts produced by the Association of Bay Area Governments (ABAG) — the latest forecast being *Projections 2007*.

Projections 2007 is designed to be a realistic assessment of growth in the region, recognizing emerging trends in markets, demographics and local policies that promote more compact infill development and transit-oriented development. Areas at rail and ferry terminals and along select transportation corridors are expected to see an increasing proportion of the region's growth, a trend that will start slowly but will build over time.

New Approach for 2009

For *Projections 2009*, ABAG will do things differently. The new forecast will explore ways to cope with the major changes expected from a growing and aging population, higher energy prices, and most significantly, climate change.

As a first step, ABAG will use regional performance objectives in its forecast, similar to the ones used in this plan:

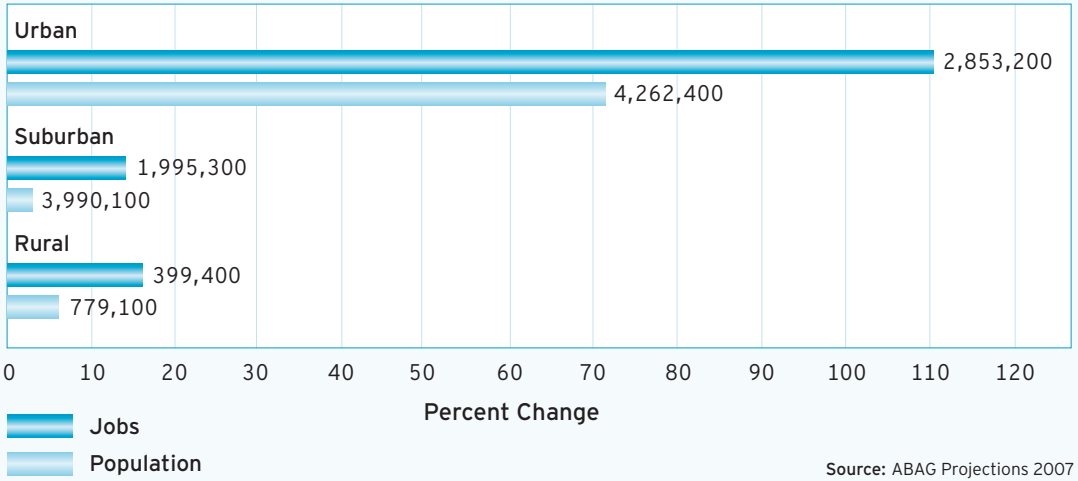
- Reduce driving per person by 10 percent below today's level
- Reduce traffic congestion by 20 percent below today's level
- Reduce carbon dioxide emissions by 40 percent below 1990 levels
- Reduce $PM_{2.5}$ (fine particulate matter) emissions by 10 percent below today's levels
- Reduce PM_{10} (coarse particulate matter) by 45 percent below today's levels
- Limit "greenfield" development to 900 acres per year over the next 25 years
- Increase access to jobs and essential services via transit or walking by 20 percent above today's levels

ABAG will assess the magnitude of change required to achieve these regional targets through two alternative development scenarios. The first, **Scattered Success,** assumes a continuation of traditional, auto-oriented development, but with a mix of projects where people can drive shorter distances, take transit and/or walk. The second scenario, **Focused Future,** takes a more intensive approach by concentrating jobs and housing in the urban core, particularly along corridors with high-frequency, accessible transit service.

Projections 2009 will be released in early 2009, and will influence the transportation investments considered by the Commission in the next long-range plan, due for adoption in 2013.

Jobs and Population Forecasts by Geographical Area

Bay Area Total in 2035 and Percent Change from 2005



Source: ABAG Projections 2007

"What If" Scenarios Test Performance Objectives

The evaluation of our hypothetical scenarios focused first on the individual infrastructure packages. Then, in each case, the transportation pricing and focused growth alternatives were added in for a combined appraisal. The results are described below and displayed on page 29.

Reducing Congestion: Freeway Operations Make a Difference

The typical Bay Area driver now spends 39 hours — nearly a full work week — each year stuck in traffic on the region's freeways. By 2035, if current trends were to continue unabated, that same driver's lost time would nearly double to 72 hours per year.

Through a combination of wise infrastructure investment, steep pricing and ambitious land-use policies, the amount of time lost to congestion could be slashed dramatically (see page 29, top left). Freeway Operations strategies alone could reduce overall delay by some 30 hours per year, achieving about two-thirds of the reductions needed to reach the 2035 performance objective of 31 vehicle hours of delay per year. With the addition of land-use and pricing strategies, we could reduce congestion to 31 hours per person each year, just meeting the objective.

Reducing Vehicle Miles Traveled: Falling Short of the Target

The difficulty of meeting the Transportation 2035 Plan's performance objectives is made clear through computer modeling that tests the various infrastructure investment options and the pricing and land-use policies against the plan's objective of a 10 percent cut in daily per-capita vehicle miles traveled (VMT), from an average of 20.3 miles in 2006 to 18.2 miles in 2035. Even the most aggressive investment in transit falls far short of the goal, with VMT rising to 21 miles per person per day (see page 29, top center). And combining transit investment with pricing and land use would achieve only about two-thirds of the hoped-for targeted reduction, with an average daily VMT of 19.3 miles — almost a full mile short of the performance objective.

Reducing Greenhouse Gases: Cold Facts for Climate Change Strategy

Massive investment in transit over the next 25 years would deliver only about 10 percent of the carbon dioxide reductions the Bay Area will need to meet the 2035 objective of limiting daily CO_2 emissions to 50,000 tons or less regionwide. Combining infrastructure investment with the test pricing and land-use policies would yield about half the needed CO_2 emissions reduction (see page 29, top right).

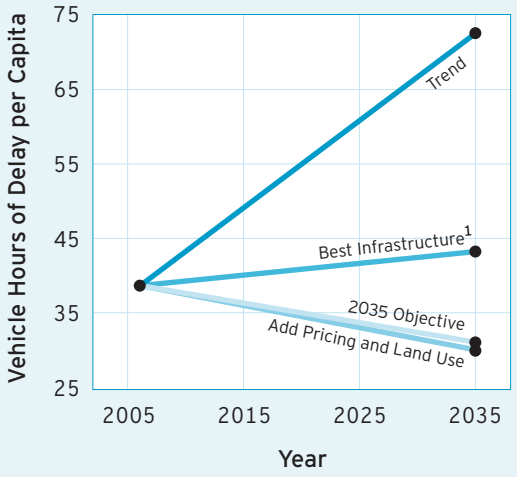
Reducing Particulate Emissions: Goals Remain Well Beyond Reach

Of all the Transportation 2035 performance objectives, the reduction of particulate emissions will be the most difficult to achieve. Particulate levels are a direct function of the amount of driving, with road dust kicked up by moving vehicles accounting for 60 to 80 percent of particulate emissions from mobile sources. Under the current trend, fine particulate ($PM_{2.5}$) emissions will grow to 21 tons per day by 2035 from 17 tons per day in 2006, and emissions of coarse particulates (PM_{10}) will grow to 85 tons per day from the current 66 tons. Given a quarter-century of continued population growth, infrastructure investments will not decrease total miles driven enough to make a significant dent in particulate emissions (see page 29, bottom left and center). Pricing and land-use strategies are more effective, but still achieve just a third of the targeted reductions for fine particulates, and only about one-seventh of the needed reductions in coarse particulates.

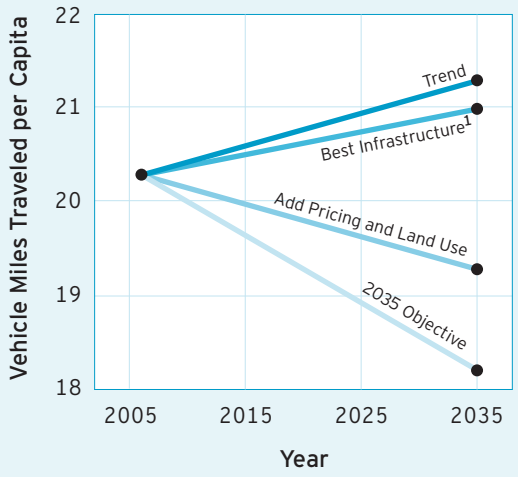
Improving Transportation and Housing Affordability: Focused Growth Spurs Positive Trend

Unlike the worsening performance trends in most other areas, the affordability of Bay Area housing and transportation is projected to improve in the years ahead (see page 29, bottom right). This is due primarily to rising incomes

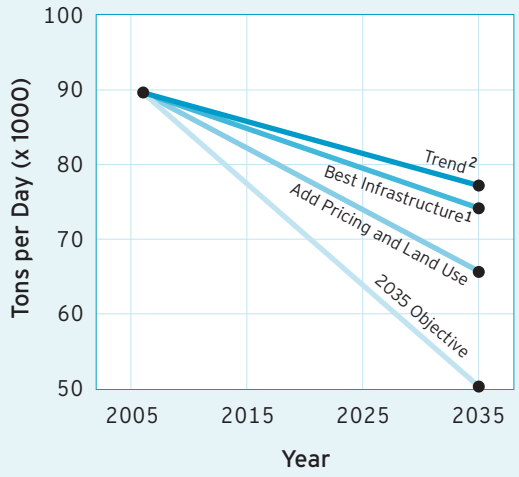
Annual Vehicle Hours of Delay



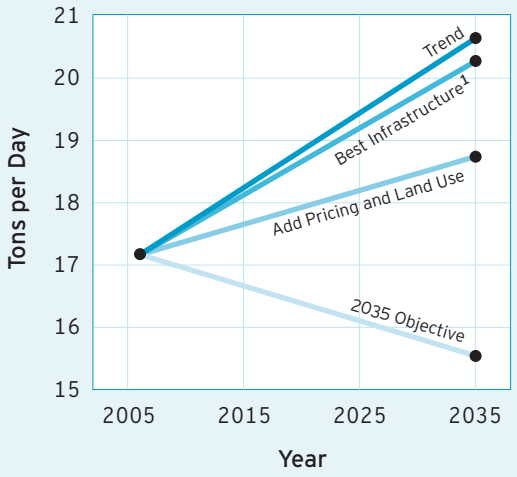
Vehicle Miles Traveled



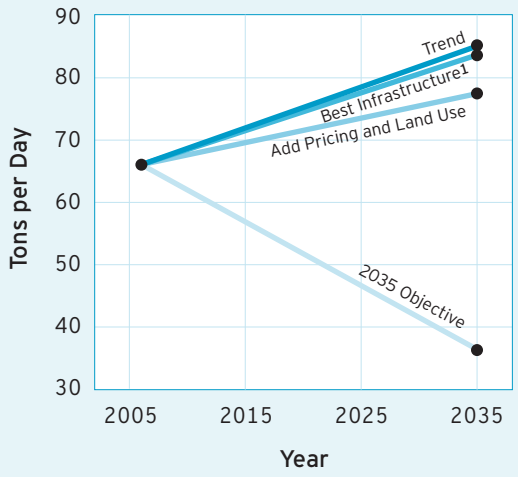
CO_2 Tons Per Day



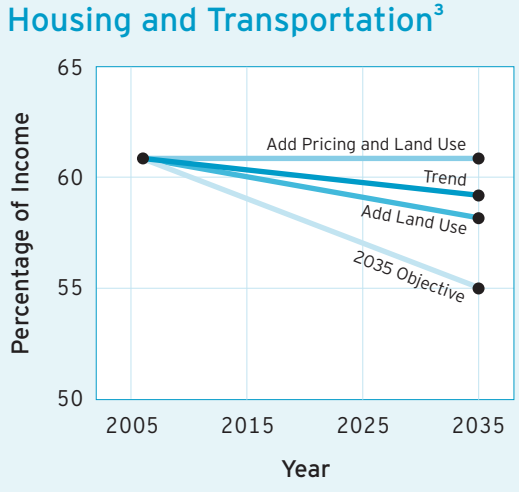
$PM_{2.5}$ Tons Per Day



PM_{10} Tons Per Day



Share of Income Spent on Housing and Transportation[3]



Source: MTC

1 Best Infrastructure represents the highest-performing option among the trio of infrastructure options evaluated.

2 Trend line from 2006 to 2035 is simplified. Passenger and light duty vehicle fuel economy improvements required by AB 32 are phased in between 2009 and 2020. CO_2 will continue to increase until about 2010, with a gradual decrease to 2035 as AB 1493 standards phase in and the existing vehicle fleet turns over with cleaner vehicles.

3 For low-income and moderately low-income households.

and the expected development of more housing near transit, which tends to reduce residents' transportation costs. The affordability target also is unique in that pricing strategies could work against the objective. Because most lower-income residents rely on cars for at least some trips, policies that raise the cost of driving will have an impact on these households, and the impact will be greater than that experienced by higher-income households. With low-income and moderately low-income households disproportionately affected by rising transportation costs, pricing policies — if pursued — will need provisions to mitigate the impacts on these households. Focused growth policies, however, can reduce transportation costs by reducing the need to own and use cars.

Results Show No Easy Answers

Assessing the Transportation 2035 performance objectives in light of future baseline conditions in 2035 and the palette of potential investment and policy strategies, we see that the challenges before us are sobering. While the targets call for dramatic improvements over the status quo, most of the trend lines indicate conditions will worsen significantly over the next 25 years. And while large-scale infrastructure investment and aggressive policy choices can move the Bay

Area closer to some of the plan's long-term goals, others remain stubbornly out of reach. In short, the lessons learned from this analysis are as follows:

Limits of Infrastructure

Infrastructure improvements alone, whether substantial investments in transit or roadways, will not move the region significantly closer to the goals. The lone exception is the Freeway Operations package, which proves to be highly effective in reducing traffic congestion.

Power of Pricing and Land Use

Policy approaches like the pricing and land-use alternatives have a much bigger effect and will be critical to advancing toward the objectives. Yet even the combination of infrastructure investment and aggressive policy choices will be insufficient to meet many of the region's long-term goals, particularly those involving greenhouse gas and particulate emissions. And while pricing strategies (though likely at lower price levels than those assumed in our analysis) can be implemented in the near term, aggressive land-use policies like those studied here would take many years to implement.

Need for Technology and Behavior Change

To reach all the objectives, additional strategies will be necessary in most cases. These could include technology advances to improve fuel economy, incentives or regulations to increase telecommuting, and other steps to reduce overall driving. The Bay Area certainly will have to forge new patterns of growth, embrace new ways of traveling, and discard many old assumptions if we are to sustain the region's economic vitality, maintain our mobility and preserve our quality of life. This analysis clearly demonstrates that while change is healthy, it can be painful too.